Oil Change

Description

This Activity Plan will demonstrate to students how to successfully perform an engine oil and filter change on a vehicle. Students will be given the opportunity to perform this activity on a vehicle of their own choosing to demonstrate the learned skills.

Lesson Outcomes

The student will be able to:

- Understand the process and protocols required to change the engine oil and filter on a vehicle
- Explain the reasons why regular oil changes are important and how they relate to the expression "pay now or pay later"
- Follow industry guidelines on recycling and disposal of plastic oil containers, used oil and filters
- Understand the reasons and benefits of the use of a torque wrench to tighten the drain plug
- Identify and competently use an oil filter wrench when required
- Research the information required to order the correct parts and supplies

Assumptions

- The student has no previous knowledge or experience in performing an oil and filter change.
- The teacher has a good understanding of this procedure and has previously performed this operation.
- Activity Plan 15: Lifting Vehicles will have been completed previous to this Activity Plan.

Terminology

All terminology required will be taught if required when it used in this task.

Estimated Time

30–60 minutes (Some students may take longer than 30 minutes the first time they conduct an oil change.)

Recommended Number of Students

20, based on the *BC Technology Educators' Best Practice Guide*

Facilities

Ideally an indoor vehicle hoist with adequate lighting and a comfortable environment.

This activity could be performed on the ground on axle stands, but this is not an advisable situation for students to see all aspects of the details being taught.

Tools

- Oil drain pan
- Oil filter wrench
- Wrenches to remove the oil pan drain plug
- A socket set with a selection of sockets (most vehicles manufactured in the past 20 years use metric drain plugs)
- Torque wrench
- Recycling containers for used oil and filter

Materials

- Work order
- Oil change checklist
- Access to vehicle information for torque values
- Engine oil
- Oil filter
- Paper towel or wipes

Resources

- Vehicle information system (All Data or Mitchell, vehicle service manual or Internet access)
- Work order
- Oil change checklist
- Clipboards and pencils

Activity

Oil has been described as the lifeblood of the engine and as such should be changed often. Oil—along with the additives placed in it—performs five basic functions:

1. Lubricates
2. Cleans
3. Cools
4. Seals
5. Cushions

Eventually the additives break down and wear out. Each vehicle manufacturer has its own recommendations on when to change the oil, but a general guideline is every 5000 km or 3 times per year.

Activity Plan 15: Lifting Vehicles will have been completed previous to this Activity Plan.

- If the vehicle is raised on a hoist for work, students should have knowledge and experience related to the safe operation of a hoist.
- If this activity is being performed at ground level, prior to its being completed students should have knowledge and experience of raising a vehicle and safely putting it on axle stands.

Prior to any work being done, Activity Plan 7: Fill In a Work Order will have been completed and the oil change checklist provided will have been filled out completely. This will ensure the proper oil and filter are available before any work begins.

1. Have students find specifications for the torque value of the engine drain plug and complete the checklist information. If any additional oils or materials are required, they must be identified and available before the service is started.
2. Ensure the oil temperature is at a safe level to be drained without risk of injury. Hot oil can cause serious burns if it comes into contact with bare skin. Proper protective clothing and safety glasses should be worn from this point forward.
3. Provide a drain pan large enough to accept more oil than the vehicle engine holds.
4. Demonstrate the proper body position for removing the engine oil drain plug to avoid getting splashed with used oil.

Figure 1—Draining oil

Due to the possible skin reaction to chemicals and pollutants in used oil, it is considered good practice (but is not mandatory) to wear latex gloves while draining engine oil.

5. If the drain pan is being supported on a stand, ensure it is never left unattended. Also, ensure it never falls over or overflows. The risk of an environmental hazard is possible and the cleanup effort is not worth the risk of leaving it unattended.
6. The drain plug should be cleaned off to remove any residual dirt and a new seal/gasket should be installed.

Figure 2—Drain plug seal

7. When the drain plug is installed, it should be tightened to the correct torque value according to the vehicle manufacturer's specification—no exceptions!

Figure 3—Use a torque wrench to tighten the oil drain plug.

The cost of replacing an oil pan that has been damaged beyond repair can be in excess of a thousand dollars if the oil pan happens to contain the transmission assembly, or the customer loses all their oil at highway speeds because the drain plug was either stripped or left loose.

8. The engine oil filter should now be removed either by hand. If it is too tight, the use of the filter wrench can now be demonstrated.

Figure 4—Remove oil filter

9. The bottom of the filter base should be cleaned with a cloth and a visual inspection should be done to ensure the old oil filter seal has been removed with the old filter. If not, look for the seal being stuck on the engine where the filter goes. The old seal must be removed. A new oil filter always comes with a new seal. If the old seal has not been removed, and the new oil filter and seal are installed, the two seals will contact each other, large amounts of oil will leak out between them under high pressure and the engine will be damaged within minutes.

Figure 5—Make sure the old oil filter seal is removed with the filter.

10. Lightly lubricate the new seal on the new oil filter base with engine oil and install it to the engine.

Figure 6—Lubricate the new oil filter seal

11. Explain to the students that an empty oil filter takes time to refill. During this refill period the engine is running without oil pressure. You will notice this when you first start the engine. The engine oil light or oil pressure gauge takes about 10 seconds before it turns off or registers pressure. This light or gauge will need to be checked when starting the engine.
12. The filter must not be over-tightened—do not turn more than ¾ to 1 turn after the seal contacts the oil filter base. Normally, the filter should be as tight as can be turned with one hand by an adult.
13. At this point the teacher may choose to discuss where and how to properly dispose of oil and oil filters.

Figure 7—Oil disposal

14. Fill the engine to the correct level with oil according to the engine specifications.

Figure 8—Fill engine oil

15. Start the engine and count to 10 while watching the engine oil light or oil pressure gauge. The light should turn off or the gauge should register pressure by the time the 10 count is done.

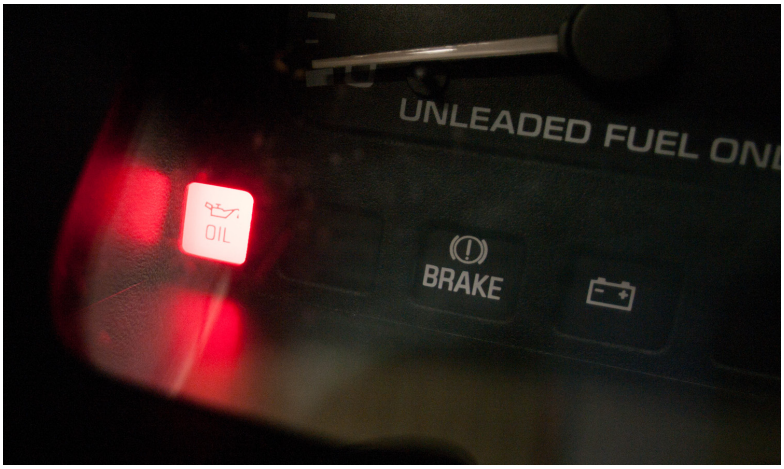

Figure 9—Oil light indicator

16. If the engine oil light does not go out after 10 seconds, turn off the engine immediately and determine the problem:
    a. Was oil installed?
    b. Was the drain plug replaced?
    c. Was the oil filter installed correctly?
    d. Was the oil filter seal removed?
17. Run the engine for about 5 minutes. If the vehicle is run in an enclosed space without good ventilation, it should preferably be connected to a proper exhaust extraction system.
18. Wait approximately 5 minutes after the engine has been turned off for all the oil to return to the oil pan. Re-check the oil level and add more if required. Do not overfill past the full mark on **the dipstick—if this occurs, some oil must be drained to avoid oil being forced out of the seals in** the engine. The space between the "add" and "full" marks on a dipstick usually represents about 1 litre of oil.

Figure 10—Check oil level using the oil dipstick

Evaluation Guidelines

The following components of the activity can be assessed:

- Completion, legibility and accuracy of work order and oil change checklist
- Practical evaluation of the oil change procedure
- Shop condition when finished (tools put away, oil wiped up, etc.)
- Vehicle condition (fingerprint marks, oil stains on the body work, etc.)
- Question/answer session on oil recycling and filter disposal

Oil Change Checklist

(This sheet must be completed before starting service work)

Customer Name_____ Date _____

Vehicle: Year_____ Make _____ Model _____

Odometer Reading _____ Licence Number _____

Engine Size _____Fuel Type _____Transmission Type_____

VIN _____

Initial as done

1. Oil filter number and manufacturer _____ _____
2. Oil capacity including filter _____ _____
3. Recommended type and viscosity _____ _____
4. Drain plug torque _____ _____
5. Transmission fluid type _____ _____
6. Rear axle/diff oil type _____ _____
7. Transfer case oil type _____ _____
8. Lug nut torque specifications _____Ft/lbs _____Nm _____
9. Tire pressures _____ Front _____
   Rear _____
   Spare _____

Service Technician's Name(s) _____Work order # _____